MULTIMEDIA UNIVERSITY

STUDENT ID NO

SEAT NO

VENUE:_____

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

PMT0101 – MATHEMATICS I

(All sections/ Groups)

14 OCTOBER 2019
9.00 a.m. – 11.00 a.m.
(2 Hours)

Question	Marks
1	/10
2	/10
3	/10
4	/10
5	/10
Total	/50

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **THIRTEEN** printed pages excluding the cover page.
2. Answer **ALL FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the **QUESTION BOOKLET**. All necessary working steps **MUST** be shown to obtain maximum marks.
4. Calculator is **NOT** allowed in this exam.

Question 1 (10 marks)

a) Simplify the expression $\frac{3y}{2}-\frac{5-y^2}{3y}$ as a single quotient. [2 marks]

b) Simplify the expression $\frac{x^{-6}y}{2^{-3}}\cdot\frac{\sqrt[3]{27}\left(x^2y\right)^2}{y^{-1}}$ and leave your answer in term of positive exponents. [3 marks]

Continued...

c) Express $\frac{3-2i}{5-3i}$ in the form $a+bi$ where $a,b \in \mathbb{R}$. [3 marks]

d) Simplify the expression $\frac{(2-5x)^4+2x(2-5x)^3}{(2-5x)^8}$ and leave your answer in term of positive exponent. [2 marks]

Continued...

Question 2 (10 marks)

Solve the following equations and inequalities.

a) $a-5\sqrt{a}+6=0$ (Hint: Let $w=\sqrt{a}$) [3 marks]

b) $\sqrt[3]{x^2-9}=3$ [2 marks]

Continued...

c) $|3-2x|=5$ [2 marks]

d) $\frac{(x+2)(x-2)}{x+3} < 0$ (Leave your answer in interval notation) [3 marks]

Continued...

Question 3 (10 marks)

a) Find an equation of a line, L that is perpendicular to the line $y=-2\pi$ and contains a point $(5,0)$. Sketch and label clearly the equation of the line, L and $y=-2\pi$. [1 mark]

b) Given a point $P(x,y)$ moves such that its distance from point $Q(-1,1)$ is always twice its distance from the origin, $O(0,0)$. Find an equation of the locus of P. Express your answer in the form, $ax^2+by^2+cx+dy+e=0$ where a, b, c, d and e are real numbers. (Hint: $PQ=2PO$) [2 marks]

Continued...

c) Given an equation of a circle $x^2+y^2+x-2y-\frac{11}{4}=0$.

i) Express the circle equation in the form $(x-h)^2+(y-k)^2=r^2$ where h, k and r are constants. [2 marks]

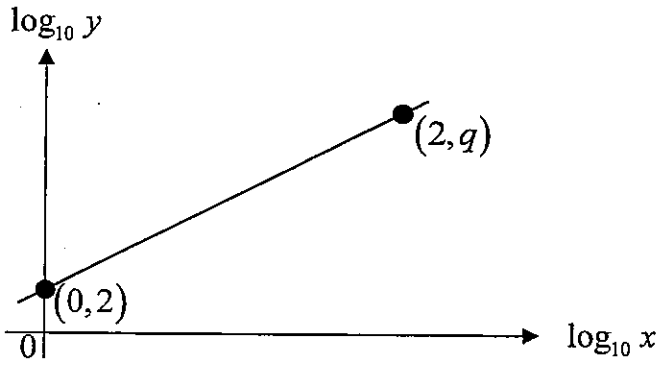
ii) Find the centre and radius of the circle. [1 mark]

Continued...

d) Two variables, x and y are related by an equation $y = kx^5$ where k is a constant.

i) Reduce the equation $y = kx^5$ to the linear form $Y = mX + c$ where $Y = \log_{10} y$ and $X = \log_{10} x$. State the quantities represented by m and c. [2 marks]

ii) The diagram below shows a straight line of the linear form of $y = kx^5$. Find the values of k and q. [2 marks]



Question 4 (10 marks)

a) Given $f(x)=5x+1$ and $g(x)=\sqrt{2+3x}$.

i) Find $(g \circ f)(x)$. [2 marks]

ii) Find the inverse of $g(x)$. [1.5 marks]

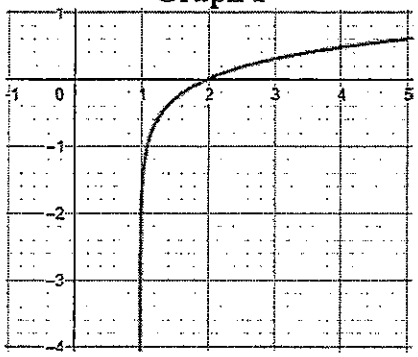
Continued...

b) Solve $\ln(x+2)-\ln x=1$. [2.5 marks]

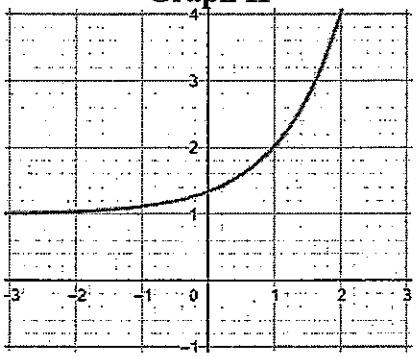
Continued...

c)

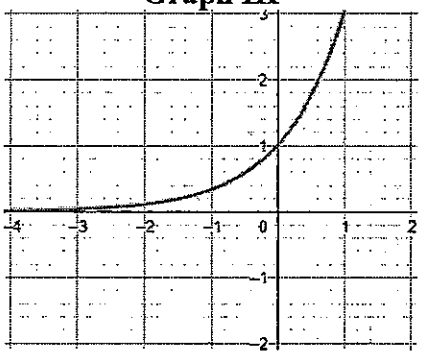
Graph I



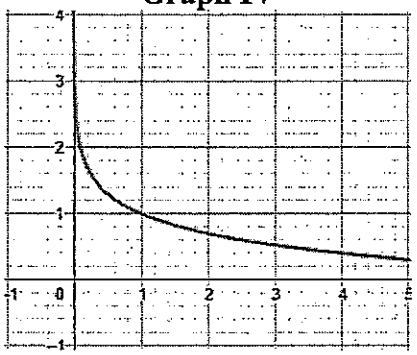
Graph II



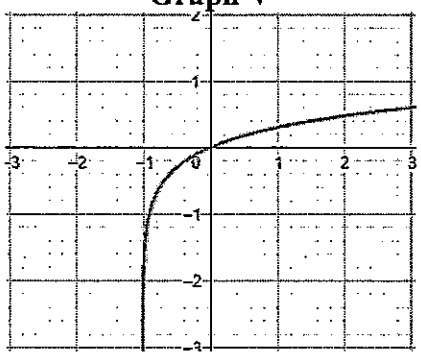
Graph III



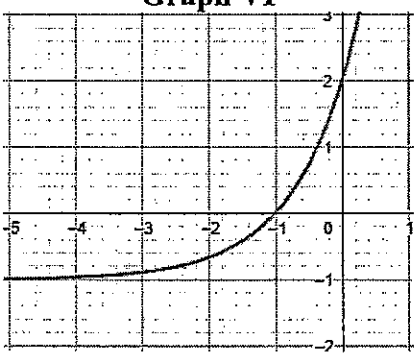
Graph IV



Graph V



Graph VI



Match each of the following exponential/ logarithmic function with one of the graphs above labeled from Graph I to Graph VI. [4 marks]

No.	Function	Corresponding Graph (Write the answer as Graph I, II, III, IV, V or VI)
i	$f(x)=3^x$	
ii	$g(x)=3^{x-1}+1$	
iii	$h(x)=\log_{10}(x+1)$	
iv	$k(x)=1-\log_{10}x$	

Continued...

Question 5 (10 marks)

a) Given the polynomial function $f(x) = x(x-1)^2(x+2)^3$.

i) What is the degree of $f(x)$? [0.5 marks]

ii) Determine the zeros of $f(x)$ and their multiplicities. Also, determine whether the graph of $f(x)$ crosses or touches the x-axis at each zero. [1.5 marks]

iii) Determine the end behavior of $f(x)$. [1 mark]

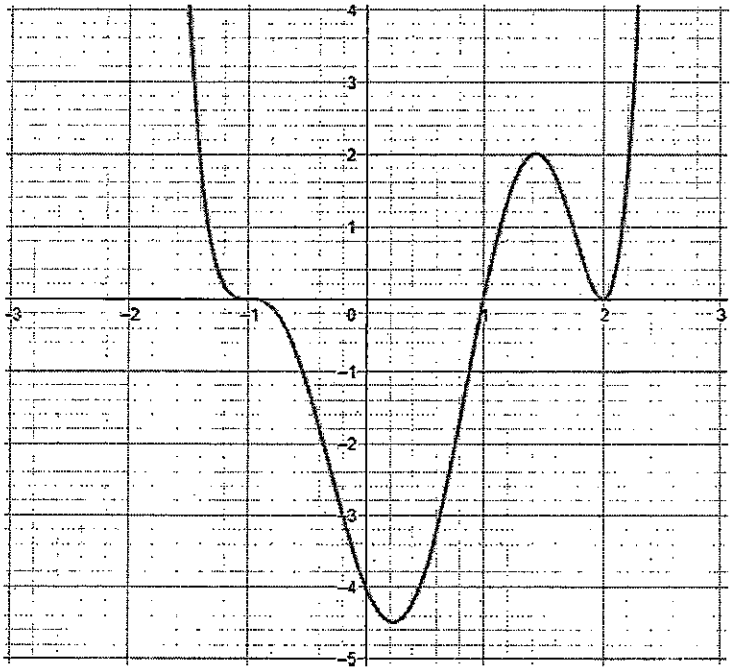
Continued...

iv) Sketch the graph of the polynomial function. Make sure your graph shows all intercepts and exhibits proper end behaviour. [2 marks]

b) Use long division to find the quotient and remainder when the polynomial $f(x) = 4x^3 + 3x^2 - 5x + 2$ is divided by $x + 2$. You are required to state clearly the quotient and the remainder. [3 marks]

Continued...

c) Find the polynomial for the graph below with the specified degree of 6. [2 marks]



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